



# LABORATORY *Spotlight*

*The National High Magnetic Field Laboratory*

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## Center for Advanced Power Systems Moves Ahead

The new Center for Advanced Power Systems (CAPS) at Florida State University held a successful two-day workshop on July 25 and 26, 2000. The workshop was held at the NHMFL and attended by over 70 individuals, representing 29 corporations, government agencies, and educational institutions. The keynote speaker for the workshop was Admiral Jay Cohen, Chief of Naval Research, who compared the switch to the all-electric ship to the historic transition from sails to steam powered ships. "This transition to all-electric ships is of that magnitude," said Admiral Cohen.

The conference was presented in three sessions; each session included a series of presentations followed by a panel discussion:

- Future Technologies and Economic Drivers, chaired by Justin Schwartz
- Near Term Systems Issues, chaired by Tom Baldwin
- New Equipment Applications, chaired by Cesar Luongo.

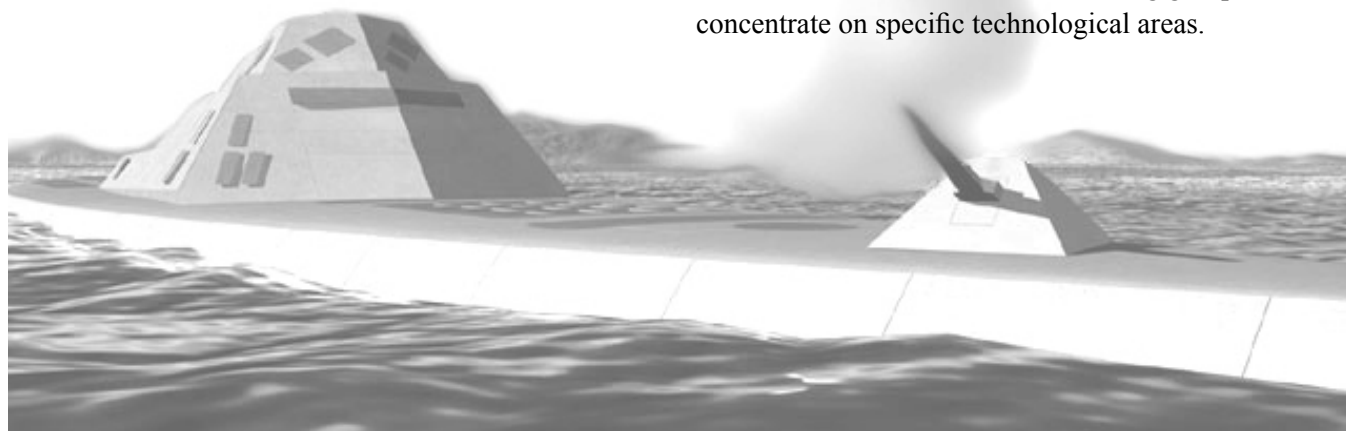
The workshop presented the CAPS staff with a wide variety of industry perspectives and provided guidance in setting organizational and technical priorities. Copies of the presentation materials and the final report were distributed to the attendees via CD-ROM.

Three questions were posed to the workshop participants. The plans developed on the basis of the workshop guidance are summarized.

### **How should CAPS structure itself to better fulfill its mission?**

CAPS should develop two staffing thrusts—one directed to educational and academic research and the other focused on more immediate issues developed in response to near-term problems generated by our industrial and Navy partnerships. The key infrastructure needs are office and lab space and computational and simulation capabilities. A new building is in the works at Innovation Park (between the Magnet Lab and the College of Engineering) that will provide CAPS with 24,000 square feet of lab and office space.

A program is in process to evaluate software and computational platforms through simulation of an actual ship, the United States Coast Guard Ice Breaker Healy. CAPS is working to strengthen relationships with Navy organizations, particularly NAVSEA, and to develop partnerships with the DOE superconductivity partnership initiative that is developing joint programs. Finally, CAPS is developing formalized industrial relationships around a formal Industrial Advisory Board model with the addition of several focused working groups that will concentrate on specific technological areas.





### **What are the major systems issues that should be addressed by CAPS?**

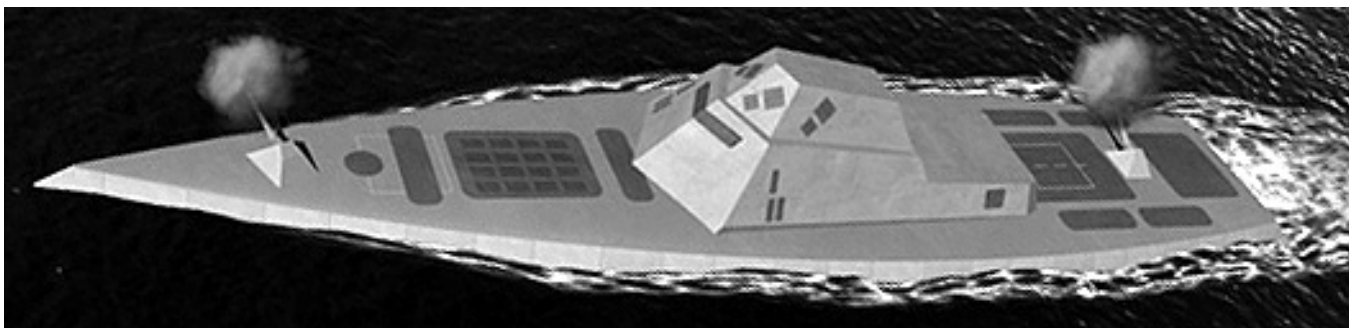
- **System Architecture:** The fundamental questions of circuit topology and physical arrangement, voltage levels, and choice of AC versus DC are the key architectural issues. Specifically, ways are needed to evaluate issues of volume, weight, operation and maintainability, and acquisition and life cycle cost in light of mission effectiveness.
- **Power Quality Management:** The nature of all-electric ship systems calls for re-examination of the issues and methods of power quality management. New ideas and new technologies in filtering and power conditioning are needed.
- **Control Technologies:** The all-electric ship operating constraints demand a high degree of automation in the electric system which creates a number of control system challenges. In addition, "health monitoring," system state sensing, and automatic system reconfiguration will be a key aspect of control.
- **Signatures:** It is important that the ship not be readily detected as a result of EMI, RF, or acoustic signatures. These phenomena need to be understood as part of the system R&D.

- **Technology Insertion:** Finally, a critical aspect of systems studies is looking ahead to the potential adoption of new technologies such as superconductivity. The impact of incorporating new technologies on the system needs to be considered in parallel and even ahead of component development.

### **What are the technologies that CAPS needs to focus on?**

Several technologies may have a profound impact on system development. CAPS needs to maintain a level of involvement in the fields of superconductivity, compact power technologies, power electronics, and advanced machine concepts. It needs to play a role in the evaluation of these technologies, develop simulation models of novel equipment, and study the system impacts of introducing these new technologies into the systems.

In conclusion, the workshop has provided CAPS with major challenges for the future. CAPS is moving forward with the assistance of FSU and the NHMFL in developing the educational program and the research infrastructure needed to support a world-class center for power system research.



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